

SEQUENCE LISTING

(1) GENERAL INFORMATION:

- 7580X
- (i) APPLICANT: Soo Hoo, William
 - (ii) TITLE OF INVENTION: MEMBRANE-BOUND CYTOKINE COMPOSITIONS COMPRISING GM-CSF AND METHODS OF MODULATING AN IMMUNE RESPONSE USING SAME
 - (iii) NUMBER OF SEQUENCES: 50
 - (iv) CORRESPONDENCE ADDRESS:
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 - (C) CITY: San Diego
 - (D) STATE: California
 - (E) COUNTRY: United States
 - (F) ZIP: 92121
 - (v) COMPUTER READABLE FORM:
 - (A) MEDIUM TYPE: Floppy disk
 - (B) COMPUTER: IBM PC compatible
 - (C) OPERATING SYSTEM: PC-DOS/MS-DOS
 - (D) SOFTWARE: PatentIn Release #1.0, Version #1.25
 - (vi) CURRENT APPLICATION DATA:
 - (A) APPLICATION NUMBER: US 08/902,516
 - (B) FILING DATE: 29-JUL-1997
 - (C) CLASSIFICATION:
 - (viii) ATTORNEY/AGENT INFORMATION:
 - (A) NAME: Campbell, Cathryn A.
 - (B) REGISTRATION NUMBER: 31,815
 - (C) REFERENCE/DOCKET NUMBER: P-IM 2442
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(2) INFORMATION FOR SEQ ID NO:1:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 660 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: both
 - (D) TOPOLOGY: linear

- (ix) FEATURE:
 - (A) NAME/KEY: CDS
 - (B) LOCATION: 1..660

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

ATG	GAG	ACA	GAC	ACA	CTC	CTG	CTA	TGG	GTA	CTG	CTG	CTC	TGG	GTT	CCA	48
Met	Glu	Thr	Asp	Thr	Leu	Leu	Leu	Trp	Val	Leu	Leu	Leu	Trp	Val	Pro	
1					5				10					15		
GGT	TCC	ACT	GGG	GAC	TAT	CCA	TAT	GAT	GTT	CCA	GAT	TAT	GCT	GGG	GCC	96
Gly	Ser	Thr	Gly	Asp	Tyr	Pro	Tyr	Asp	Val	Pro	Asp	Tyr	Ala	Gly	Ala	

58

20	25	30	
CAA GCA CCC ACC CGC TCA CCC ATC ACT GTC ACC CGG CCT TGG AAG CAT Gln Ala Pro Thr Arg Ser Pro Ile Thr Val Thr Arg Pro Trp Lys His	35	40	45
GTA GAG GCC ATC AAA GAA GCC CTG AAC CTC CTG GAT GAC ATG CCT GTC Val Glu Ala Ile Lys Glu Ala Leu Asn Leu Leu Asp Asp Met Pro Val	50	55	60
ACG TTG AAT GAA GAG GTA GAA GTC GTC TCT AAC GAG TTC TCC TTC AAG Thr Leu Asn Glu Glu Val Glu Val Val Ser Asn Glu Phe Ser Phe Lys	65	70	75
AAG CTA ACA TGT GTG CAG ACC CGC CTG AAG ATA TTC GAG CAG GGT CTA Lys Leu Thr Cys Val Gln Thr Arg Leu Lys Ile Phe Glu Gln Gly Leu	85	90	95
CGG GGC AAT TTC ACC AAA CTC AAG GGC GCC TTG AAC ATG ACA GCC AGC Arg Gly Asn Phe Thr Lys Leu Lys Gly Ala Leu Asn Met Thr Ala Ser	100	105	110
TAC TAC CAG ACA TAC TGC CCC CCA ACT CCG GAA ACG GAC TGT GAA ACA Tyr Tyr Gln Thr Tyr Cys Pro Thr Pro Glu Thr Asp Cys Glu Thr	115	120	125
CAA GTT ACC ACC TAT GCG GAT TTC ATA GAC AGC CTT AAA ACC TTT CTG Gln Val Thr Thr Tyr Ala Asp Phe Ile Asp Ser Leu Lys Thr Phe Leu	130	135	140
ACT GAT ATC CCC TTT GAA TGC AAA AAA CCA GGC CAA AAA GTC GAC GAA Thr Asp Ile Pro Phe Glu Cys Lys Lys Pro Gly Gln Lys Val Asp Glu	145	150	155
CAA AAA CTC ATC TCA GAA GAG GAT CTG AAT GCT GTG GGC CAG GAC ACG Gln Lys Leu Ile Ser Glu Glu Asp Leu Asn Ala Val Gly Gln Asp Thr	165	170	175
CAG GAG GTC ATC GTG GTG CCA CAC TCC TTG CCC TTT AAG GTG GTG GTG Gln Glu Val Ile Val Val Pro His Ser Leu Pro Phe Lys Val Val Val	180	185	190
ATC TCA GCC ATC CTG GCC CTG GTG GTG CTC ACC ATC ATC TCC CTT ATC Ile Ser Ala Ile Leu Ala Leu Val Val Leu Thr Ile Ser Leu Ile	195	200	205
ATC CTC ATC ATG CTT TGG CAG AAG AAG CCA CGT TAG Ile Leu Ile Met Leu Trp Gln Lys Lys Pro Arg	210	215	220

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 219 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Met Glu Thr Asp Thr Leu Leu Leu Trp Val Leu Leu Leu Trp Val Pro

1	5	10	15
Gly Ser Thr	Gly Asp Tyr	Pro Tyr Asp Val	Pro Asp Tyr Ala Gly Ala
	20	25	30
Gln Ala Pro	Thr Arg Ser	Pro Ile Thr	Val Thr Arg Pro Trp Lys His
	35	40	45
Val Glu Ala	Ile Lys Glu	Ala Leu Asn	Leu Leu Asp Asp Met Pro Val
	50	55	60
Thr Leu Asn	Glu Glu Val	Glu Val Val	Ser Asn Glu Phe Ser Phe Lys
	65	70	75
Lys Leu Thr	Cys Val Glu	Thr Arg Leu	Lys Ile Phe Glu Gln Gly Leu
	85	90	95
Arg Gly Asn	Phe Thr Lys	Leu Lys Gly Ala	Leu Asn Met Thr Ala Ser
	100	105	110
Tyr Tyr Gln	Thr Tyr Cys	Pro Pro Thr	Pro Glu Thr Asp Cys Glu Thr
	115	120	125
Gln Val Thr	Thr Tyr Ala	Asp Phe Ile	Asp Ser Leu Lys Thr Phe Leu
	130	135	140
Thr Asp Ile	Pro Phe Glu	Cys Lys Lys	Pro Gly Gln Lys Val Asp Glu
	145	150	155
Gln Lys Leu	Ile Ser Glu	Glu Asp Leu	Asn Ala Val Gly Gln Asp Thr
	165	170	175
Gln Glu Val	Ile Val Val	Pro His Ser	Leu Pro Phe Lys Val Val Val
	180	185	190
Ile Ser Ala	Ile Leu Ala	Leu Val Val	Leu Thr Ile Ile Ser Leu Ile
	195	200	205
Ile Leu Ile	Met Leu Trp	Gln Lys Lys	Pro Arg
	210	215	

(2) INFORMATION FOR SEQ ID NO:3:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

Val Gln Gly Glu Glu Ser Asn Asp Lys
1 5

(2) INFORMATION FOR SEQ ID NO:4:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 25 amino acids
 - (B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

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Phe Ile Leu Pro Ile Leu Gly Ala Val Leu Ala Leu Leu Leu Leu
1           5           10          15
Thr Leu Leu Ala Leu Leu Leu Leu Val
          20          25

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(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 26 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

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Ile Tyr Leu Ile Ile Gly Ile Cys Gly Gly Gly Ser Leu Leu Met Val
1           5           10          15
Phe Val Ala Leu Leu Val Phe Tyr Ile Thr
          20          25

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(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 22 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

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Ala Leu Val Val Ile Pro Ile Ile Phe Gly Ile Leu Phe Ala Ile Leu
1           5           10          15
Leu Val Leu Val Phe Ile
          20

```

(2) INFORMATION FOR SEQ ID NO:7:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

Ile Ser Gly Ala Thr Ala Gly Val Pro Thr Leu Leu Leu Gly Leu Val
1 5 10 15

Leu Pro Ala Pro
20

(2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 24 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

Leu Leu Leu Gly Val Ser Val Ser Cys Ile Val Ile Leu Ala Val Cys
1 5 10 15

Leu Leu Cys Tyr Val Ser Ile Thr
20

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 24 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

Val Ala Gly Val Val Ile Ile Val Ile Leu Leu Ile Leu Thr Gly Ala
1 5 10 15

Gly Leu Ala Ala Tyr Phe Phe Tyr
20

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 25 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

Phe Leu Phe Thr Pro Val Val Val Ala Cys Met Ser Ile Met Ala Leu
1 5 10 15

Leu Leu Leu Leu Leu Leu Leu Leu

20

25

(2) INFORMATION FOR SEQ ID NO:11:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 30 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

Val	Val	Val	Ile	Ser	Ala	Ile	Leu	Ala	Leu	Val	Val	Leu	Thr	Ile	Ile
1				5					10					15	
Ser	Leu	Ile	Ile	Leu	Ile	Met	Leu	Trp	Gln	Lys	Lys	Pro	Arg		
			20				25						30		

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 26 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

Glu	Leu	Thr	Val	Ala	Ala	Ala	Val	Leu	Val	Leu	Val	Ile	Val	Ser
1				5				10					15	
Ile	Ser	Leu	Ile	Val	Leu	Val	Val	Thr	Trp					
			20					25						

(2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 24 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

Leu	Thr	Tyr	Phe	Gly	Gly	Ala	Val	Ala	Ser	Thr	Ile	Gly	Leu	Ile	Met
1				5					10					15	
Gly	Gly	Thr	Leu	Leu	Ala	Leu	Leu								
			20												

(2) INFORMATION FOR SEQ ID NO:14:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 34 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Val	Lys	Cys	Gly	Gly	Ile	Ser	Leu	Leu	Val	Gln	Asn	Thr	Ser	Trp	Leu
1				5					10					15	

Leu	Leu	Leu	Leu	Leu	Ser	Leu	Ser	Phe	Leu	Gln	Ala	Thr	Asp	Phe	Ile
				20				25					30		

Ser Leu

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

Thr	Val	Leu	Leu	Pro	Leu	Val	Ile	Phe	Phe	Gly	Leu	Cys	Leu	Leu	Ser
1					5				10					15	

Leu	Leu	Phe	Ile	Gly	Leu	Met
				20		

(2) INFORMATION FOR SEQ ID NO:16:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

Leu	Leu	Val	Leu	Tyr	Phe	Ala	Ser	Ser	Leu	Ile	Ile	Pro	Ala	Ile	Gly
1					5				10					15	

Met	Ile	Ile	Tyr	Phe	Ala	Arg
			20			

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 9 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

64

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

Ile Ile Ser Ala Val Val Gly Ile Leu
1 5

(2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

Lys Ile Phe Gly Ser Leu Ala Phe Leu
1 5

(2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 10 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr
1 5 10

(2) INFORMATION FOR SEQ ID NO:20:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 20 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

Pro Asp Thr Arg Pro Ala Pro Gly Ser Thr Ala Pro Pro Ala His Gly
1 5 10 15

Val Thr Ser Ala
20

(2) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

Glu Ala Asp Pro Thr Gly His Ser Tyr
1 5

(2) INFORMATION FOR SEQ ID NO:22:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

Ser Ala Tyr Gly Glu Pro Arg Lys Leu
1 5

(2) INFORMATION FOR SEQ ID NO:23:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

Glu Val Asp Pro Ile Gly His Leu Tyr
1 5

(2) INFORMATION FOR SEQ ID NO:24:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Phe Leu Trp Gly Pro Arg Ala Leu Val
1 5

(2) INFORMATION FOR SEQ ID NO:25:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:
Ala Ala Arg Ala Val Phe Leu Ala Leu
1 5
- (2) INFORMATION FOR SEQ ID NO:26:
- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 8 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:
Tyr Arg Pro Arg Pro Arg Arg Tyr
1 5
- (2) INFORMATION FOR SEQ ID NO:27:
- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:
Val Leu Pro Asp Val Phe Ile Arg Cys
1 5
- (2) INFORMATION FOR SEQ ID NO:28:
- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:
Ala Tyr Gly Leu Asp Phe Tyr Ile Leu
1 5
- (2) INFORMATION FOR SEQ ID NO:29:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 9 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:
 Lys Thr Trp Gly Gln Tyr Trp Gln Val
 1 5
- (2) INFORMATION FOR SEQ ID NO:30:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 9 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:
 Ile Thr Asp Gln Val Pro Phe Ser Val
 1 5
- (2) INFORMATION FOR SEQ ID NO:31:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 9 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:
 Tyr Leu Glu Pro Gly Pro Val Thr Ala
 1 5
- (2) INFORMATION FOR SEQ ID NO:32:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:
 Leu Leu Asp Gly Thr Ala Thr Leu Arg Leu
 1 5 10
- (2) INFORMATION FOR SEQ ID NO:33:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:
 Val Leu Tyr Arg Tyr Gly Ser Phe Ser Val
 1 5 10
- (2) INFORMATION FOR SEQ ID NO:34:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 9 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:
 Ala Ala Gly Ile Gly Ile Leu Thr Val
 1 5
- (2) INFORMATION FOR SEQ ID NO:35:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 9 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:
 Ile Leu Thr Val Ile Leu Gly Val Leu
 1 5
- (2) INFORMATION FOR SEQ ID NO:36:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 9 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:
 Met Ser Leu Gln Arg Gln Phe Leu Arg
 1 5
- (2) INFORMATION FOR SEQ ID NO:37:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:
Met Leu Leu Ala Val Leu Tyr Cys Leu
1 5
- (2) INFORMATION FOR SEQ ID NO:38:
- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:
Tyr Met Asn Gly Thr Met Ser Gln Val
1 5
- (2) INFORMATION FOR SEQ ID NO:39:
- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:
Ser Glu Ile Trp Arg Asp Ile Asp Phe
1 5
- (2) INFORMATION FOR SEQ ID NO:40:
- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 9 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:
Ala Phe Leu Pro Trp His Arg Leu Phe
1 5
- (2) INFORMATION FOR SEQ ID NO:41:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 13 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:41:

Gln Asn Ile Leu Leu Ser Asn Ala Pro Leu Gly Pro Gln
 1 5 10

(2) INFORMATION FOR SEQ ID NO:42:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 13 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

Ser Tyr Leu Gln Asp Ser Asp Pro Asp Ser Phe Gln Asp
 1 5 10

(2) INFORMATION FOR SEQ ID NO:43:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:43:

Ser Tyr Leu Asp Ser Gly Ile His Phe
 1 5

(2) INFORMATION FOR SEQ ID NO:44:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

Glu Glu Lys Leu Ile Val Val Leu Phe
 1 5

(2) INFORMATION FOR SEQ ID NO:45:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:
 Ala Cys Asp Pro His Ser Gly His Phe Val
 1 5 10
- (2) INFORMATION FOR SEQ ID NO:46:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 25 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:
 Gly Val Ser Pro Lys Val Cys Lys Asp Val Thr Val Glu Gly Ser Asn
 1 5 10 15
 Glu Phe Ala Pro Val Gln Asn Leu Thr
 20 25
- (2) INFORMATION FOR SEQ ID NO:47:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 38 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:
 Gly Cys Gly Gly Ala Gly Gly Gly Gly Cys Cys Cys Thr Ala Gly Cys
 1 5 10 15
 Ala Cys Cys Cys Ala Cys Cys Cys Gly Cys Thr Cys Ala Cys Cys Cys
 20 25 30
 Ala Thr Cys Ala Cys Thr
 35
- (2) INFORMATION FOR SEQ ID NO:48:
- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 43 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

Ala Cys Cys Gly Cys Gly Gly Thr Cys Gly Ala Cys Thr Thr Thr Thr
 1 5 10 15
 Thr Gly Gly Ala Cys Thr Gly Gly Thr Thr Thr Thr Thr Thr Gly Cys
 20 25 30
 Ala Thr Thr Cys Ala Ala Ala Gly Gly Gly
 35 40

(2) INFORMATION FOR SEQ ID NO:49:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 37 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: both
- (D) TOPOLOGY: linear

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 1..37

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

GCG GCC GCT CGA GAT CAG CCT CGA CTG TGC CTT CTA G
 Ala Ala Ala Arg Asp Gln Pro Arg Leu Cys Leu Leu
 1 5 10

37

(2) INFORMATION FOR SEQ ID NO:50:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 12 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

Ala Ala Ala Arg Asp Gln Pro Arg Leu Cys Leu Leu
 1 5 10